

IN THE CLAIMS:

1. (Previously Amended) A semiconductor laser element comprising
a substrate,
a plurality of semiconductor layers formed on the substrate, and
a concave portion formed on one surface of the substrate, said one surface being opposite
to the other surface having the semiconductor layers formed thereon, wherein
the concave portion is filled with a metal having a heat conductivity higher than the
substrate, and wherein

the depth of the concave portion is at least equal to the thickness of the substrate.

2. (Original) A semiconductor laser element comprising
a substrate,
a plurality of semiconductor layers formed on the substrate, and
a concave portion formed on at least a part of one surface of the semiconductor layer,
said one surface being the surface further from the substrate, wherein
the concave portion is filled with a metal having a heat conductivity higher than the
semiconductor layer.

3. (Current Amended) The semiconductor laser element according to claim 2, wherein
~~another~~ a second concave portion is formed on one surface of the substrate, said one surface
being opposite to the other surface having the semiconductor layers formed thereon, and wherein
said ~~another~~ second concave portion is filled with a metal having a heat conductivity
higher than the substrate.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/826,851

4. (Original) The semiconductor laser element according to any of claims 1 to 3, wherein the concave portion has a reverse mesa form in a direction vertical to a light-emitting face.

5. (Currently Amended) The semiconductor laser element according to any of claims 1 to 3, wherein a heatsink is connected to the metal filled in the first concave portion.

6. (Original) The semiconductor laser element according to any of claims 1 to 3, wherein a plurality of light-emitting portions are formed on the semiconductor layer to form a semiconductor laser array.

7. (Previously Amended) The semiconductor laser element according to any of claims 1 to 3, wherein said semiconductor laser element is a light source for exciting a solid laser.

8. (Cancelled)

9. (Cancelled)

10. (Cancelled)

11. (Cancelled)

12. (Cancelled)

13. (Cancelled)

14. (Cancelled)

15. (Cancelled)

16. (Cancelled)

17. (Cancelled)

18. (Original) A semiconductor laser element comprising a GaN substrate equipped with one of a pair of electrodes,

a semiconductor layer made of a GaN-base semiconductor including at least an active layer, said semiconductor layer disposed on the GaN substrate, and

the other one of the pair of electrodes disposed on the semiconductor layer, and

an electric current injection region formed on the semiconductor layer, wherein

a groove is formed on one surface of the GaN substrate at a region thereon corresponding to the electric current injecting region, said one surface being the surface further from the semiconductor layer, said groove reaching to the depth of the semiconductor layer, and wherein

said one of the pair of electrodes is formed on the surface of the groove.

19. (Original) The semiconductor laser element according to claim 18, wherein a contact layer is formed on the GaN substrate side of the semiconductor layer, and

wherein the contact layer is ohmic-connected to the electrode formed on the surface of the groove.

20. (Previously Amended) The semiconductor laser element according to claim 18 or 19, wherein the groove is filled with a metal having a heat conductivity higher than the GaN substrate,

wherein the surface having the groove is flattened, and wherein,

a heatsink is connected to the flattened surface.

21. (Original) The semiconductor laser element according to claim 20 wherein the metal is Au.

23. (Previously Added) A semiconductor laser element comprising

a substrate,

a plurality of semiconductor layers formed on the substrate, and

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/826,851

Claim a groove formed on one surface of the substrate, said one surface being opposite to the other surface having the semiconductor layers formed thereon, wherein the groove extends to the depth of the substrate, and wherein the groove is filled with a metal having a heat conductivity higher than the substrate.
